

**WHAT IS CLAIMED IS:**

1. A digital display apparatus for a vehicle, comprising:
  - an optical engine including a light source;
  - a reflection type digital light deflector that has a plurality of
  - 5 micro mirror elements arranged to be respectively tiltable, that digitally switches a tilt angle of each of the micro mirror elements between a first tilt angle and a second tilt angle to switch a reflection direction of a light from the optical engine between a first reflection direction as an ON state and a second reflection direction as an OFF state;
  - 10 a light irradiation unit that irradiates an ON state light reflected from the reflection type digital light deflector on a road surface; and
  - an information display unit that controls the reflection type digital light deflector, and that displays information using a contrast between the ON state light and an OFF state light reflected from the
  - 15 reflection type digital light deflector on the road surface via the light irradiation unit.
2. The digital display apparatus according to claim 1, further comprising:
  - 20 an information acquisition unit that acquires environmental information surrounding the vehicle, and that outputs the environmental information acquired as an Information signal, wherein
  - the information display unit controls the reflection type digital light deflector based on the information signal.

25

3. The digital display apparatus according to claim 2, wherein  
the information acquisition unit is a global positioning system  
that outputs a position information signal.
- 5 4. The digital display apparatus according to claim 1, wherein  
the information is displayed on the road surface within about 17  
meters ahead in a direction of traveling of the vehicle.
5. The digital display apparatus according to claim 1, wherein  
10 the information is displayed on the road surface within about 14  
meters ahead in a direction of traveling of the vehicle.
6. The digital display apparatus according to claim 1, wherein  
the information is displayed on the road surface within a range  
15 from about 4 meters to about 17 meters ahead in a direction of travelling  
of the vehicle.
7. The digital display apparatus according to claim 1, wherein  
the information includes at least one of a graphic, a symbol, a  
20 letter, a number, a leveling mark, and a mark that indicates width of the  
vehicle.
8. A digital display apparatus for a vehicle, comprising:  
two optical engine, each of which includes a light source;  
25 two reflection type digital light deflectors, each of has a plurality

of micro mirror elements arranged to be respectively tiltable, and  
digitally switches a tilt angle of each of the micro mirror elements  
between a first tilt angle and a second tilt angle to switch a reflection  
direction of light from the optical engines between a first reflection  
5 direction as an ON state and a second reflection direction as an OFF  
state;

two light irradiation units, each of which irradiates an ON state  
light reflected from the reflection type digital light deflectors on a road  
surface; and

10 an information display unit that controls the reflection type  
digital light deflectors, and that displays information using a contrast  
between the ON state light and an OFF state light reflected from the  
reflection type digital light deflectors on the road surface via the light  
irradiation units, wherein

15 one of the two reflection digital light deflectors forms the  
information with the OFF state light under control of the information  
display unit,

other of the two reflection digital light deflectors forms a  
non-lighting portion with the OFF state light under control of the  
20 information display unit, and

the information display unit displays the information and the  
non-lighting portion on the road surface via the light irradiation units so  
that the non-lighting portion surrounds the information.

25 9. The digital display apparatus according to claim 8, further

comprising:

an information acquisition unit that acquires environmental information surrounding the vehicle, and that outputs the environmental information acquired as an information signal, wherein

5 the information display unit controls the reflection type digital light deflectors based on the information signal.

10. The digital display apparatus according to claim 9, wherein the information acquisition unit is a global positioning system  
10 that outputs a position information signal.

11. The digital display apparatus according to claim 8, wherein the information is displayed on the road surface within about 17 meters ahead in a direction of traveling of the vehicle.

15

12. The digital display apparatus according to claim 8, wherein the information is displayed on the road surface within about 14 meters ahead in a direction of traveling of the vehicle.

20 13. The digital display apparatus according to claim 8, wherein the information is displayed on the road surface within a range from about 4 meters to about 17 meters ahead in a direction of travelling of the vehicle.

25 14. The digital display apparatus according to claim 8, wherein

the information includes at least one of a graphic, a symbol, a letter, a number, a leveling mark, and a mark that indicates width of the vehicle.

- 5    15.    A method of displaying information for a digital display apparatus for a vehicle, the digital display apparatus including two reflection type digital light deflectors, the method comprising:
- calculating a polygon that is a shape of information to be displayed;
- 10                               outputting the polygon to one of the reflection type digital light deflectors as a first control signal;
- calculating a first rectangle that surrounds the polygon;
- calculating a second rectangle that surrounds the first rectangle;
- outputting the second rectangle to other of the reflection type
- 15    digital light deflectors as a second control signal; and
- displaying information that is formed by the one of the reflection type digital light deflectors based on the first control signal and a non-lighting portion formed by the other of the reflection type digital light deflectors based on the second control signal on a road surface so
- 20    that the non-lighting portion surrounds the information.
16.    The method according to claim 15, further comprising:
- acquiring environmental information surrounding the vehicle;
- and    outputting the environmental information acquired as an
- 25    information signal, wherein

the information to be displayed is determined based on the information signal.

17. The method according to claim 15, wherein  
5 the information is displayed on the road surface within about 17 meters ahead in a direction of traveling of the vehicle.
18. The method according to claim 15, wherein  
the information is displayed on the road surface within about 14  
10 meters ahead in a direction of traveling of the vehicle.
19. The method according to claim 15, wherein  
the information is displayed on the road surface within a range  
from about 4 meters to about 17 meters ahead in a direction of traveling  
15 of the vehicle.
20. The method according to claim 15, wherein  
the information includes at least one of a graphic, a symbol, a  
letter, a number, a leveling mark, and a mark that indicates width of the  
20 vehicle.